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(22) International Filing Date: 18 September 2000 (18.09.2000)

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(26) Publication Language: English

(30) Priority Data: 9922346.3 21 September 1999 (21.09.1999) GB

(71) Applicant (for all designated States except US): ZENECA LIMITED [GB/GB]; 15 Stanhope Gate, London W1Y 6LN (GB).

(72) Inventors; and

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(74) Agents: HUSKISSON, Frank, Mackie et al.; Zeneca Agrochemicals, Intellectual Property Dept., Jealott's Hill International Research Centre, P.O. Box 3538, Bracknell RG42 6YA (GB).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

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Published:

— Without international search report and to be republished upon receipt of that report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/21770 A2

(54) Title: GST SEQUENCES FROM SOYBEAN AND THEIR USE IN THE PRODUCTION OF HERBICIDE RESISTANT PLANTS

(57) Abstract: The present invention relates to *inter alia*, Glutathione-S-Transferase (GST) and homoglutathione synthetase sequences from soybean and their use in the production of plants which are resistant to herbicides which comprise fomesafen and/or acifluorfen. In a particular embodiment the invention provides a GST depicted as SEQ ID No. 10 and a homoglutathione synthetase depicted as SEQ ID No. 1.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PPD 50449/WO	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No PCT/GB00/03573	International filing date (day/month/year) 18/09/2000	Priority date (day/month/year) 21/09/1999
International Patent Classification (IPC) or national classification and IPC C12N9/00		
Applicant SYNGENTA LIMITED et al		
<p>1 This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36</p> <p>2 This REPORT consists of a total of 7 sheets, including this cover sheet</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT)</p> <p>These annexes consist of a total of sheets</p>		
<p>3 This report contains indications relating to the following items</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input checked="" type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input checked="" type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application 		

Date of submission of the demand 08/03/2001	Date of completion of this report 22 01 2002
Name and mailing address of the international preliminary examining authority  European Patent Office D-80298 Munich Tel +49 89 2399 - 0 Tx 523656 epmu d Fax +49 89 2399 - 4465	Authorized officer Nichogiannopoulou, A Telephone No +49 89 2399 8054



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No PCT/GB00/03573

I Basis of the report

1 With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*)
Description, pages:

1-26 as originally filed

Claims, No.:

1-27 as originally filed

Drawings, sheets.

1/4-4/4 as originally filed

Sequence listing part of the description, pages

1-29, as originally filed

2 With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item

These elements were available or furnished to this Authority in the following language , which is

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b))
- the language of publication of the international application (under Rule 48.3(b))
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3)

3 With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing

- contained in the international application in written form
- filed together with the international application in computer readable form
- furnished subsequently to this Authority in written form
- furnished subsequently to this Authority in computer readable form
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4 The amendments have resulted in the cancellation of

**INTERNATIONAL PRELIMINARY
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International application No PCT/GB00/03573

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Description, pages:

1-26 as originally filed

Claims, No :

1-27 as originally filed

Drawings, sheets.

1/4-4/4 as originally filed

Sequence listing part of the description, pages

1-29, as originally filed

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- the language of publication of the international application (under Rule 48 3(b))
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55 2 and/or 55 3)

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International application No PCT/GB00/03573

- the description, pages
- the claims, Nos
- the drawings, sheets

5 This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70 2(c))

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report)

6 Additional observations, if necessary

II. Priority

1 This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested

copy of the earlier application whose priority has been claimed

translation of the earlier application whose priority has been claimed

2 This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid

Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date

3 Additional observations, if necessary
see separate sheet

IV Lack of unity of invention

1 In response to the invitation to restrict or pay additional fees the applicant has

restricted the claims

paid additional fees

paid additional fees under protest

neither restricted nor paid additional fees

2 This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68 1, not to invite the applicant to restrict or pay additional fees

3 This Authority considers that the requirement of unity of invention in accordance with Rules 13 1, 13 2 and 13 3 is

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No PCT/GB00/03573

- complied with
- not complied with for the following reasons

4 Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report

- all parts
- the parts relating to claims Nos 1-5, 26 all completely and 14-25 all partially

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Statement

Novelty (N)	Yes	Claims 1, 2, 4, 6-27
	No	Claims 3, 5
Inventive step (IS)	Yes	Claims 1, 2, 4, 6-11, 26, 27
	No	Claims 3, 5, 12-25

Industrial applicability (IA) Yes Claims 1-27
No Claims

2 Citations and explanations
see separate sheet

Re Item II

Priority

- 1 The present application validly claims priority from 21 09 1999 Any documents cited in the International Search Report as P documents have therefore not been considered as comprised in the prior art relevant for the present application

Re Item IV

Lack of unity of invention

- 1 The present application lacks unity as required by Article 3(4)(iii) PCT and Rule 13 PCT Unity of invention exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding "special technical features", i e features that define a contribution which each of the inventions make over prior art Each of the two groups of inventions listed above constitutes a separate, distinct invention for the following reason The common concept linking these two groups is glutathione and homoglutathione metabolism Invention I relates to herbicide detoxification by conjugation to thiol glutathione (GSH), catalysed by glutathione-S- transferase (GST) Invention II relates to the formation of homoglutathione (hGSH) catalysed by homoglutathione synthetase Glutathione and homoglutathione as well as genes involved in their synthesis are already known from Frendo et al , 1999, Plant Journal 17 215 Since no other "special" technical feature (Rule 13 2 PCT) could be identified to provide a linking concept between the two groups, each must be considered as a separate invention

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No PCT/GB00/03573

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 1 Reference is made to the following documents

D1 DATABASE EMBL [Online] ACCESSION NO AI440996, 16 March 1999 (1999-03-16) SHOEMAKER R., ET AL 'sa63f01 y1 Gm-c1004 Glycine max cDNA clone GENOME SYSTEMS CLONE ID Gm-c1004-3986 5' similar to TR O04562 O04562 T7N9 15 .. mRNA sequence 'XP002163493

D2 DATABASE EMBL [Online] ACCESSION NO AI731664, 12 June 1999 (1999-06-12) BLEWITT M., 'BNLGH10422 Six-day Cotton fiber Gossypium hirsutum cDNA 5' similar to (AF064201) glutathione S-transferase [Gossypium hirsutum], mRNA sequence 'XP002163494

1 2 The following documents were not cited in the international search report. Copies of the documents are appended hereto

D3 WO 93 01294 (IMPERIAL CHEMICAL IND PLC) 21 January 1993 (21 01 93)

D4 WO 98 20144 (ZENECA Ltd) 14 May 1998 (14 05 98)

2 **Novelty (Article 33(2) PCT)**

The present application discloses methods for creating herbicide resistant plants using the soybean enzyme glutathione-S-transferase (GST). GST catalyses herbicide detoxification by conjugation to thiol glutathione or homoglutathione

2 1 D1 discloses a soybean EST that is 99 7% identical to SEQ ID No 14 of the present application over 372 nucleotides. D1 is thus detrimental to the novelty and inventive step of claims 3 and 5

2 2 D2 discloses a cotton fiber EST that is 64 5% identical to SEQ ID No 14 of the present application over 580 nucleotides. D2 is thus detrimental to the novelty and inventive step of claim 5

3 **Inventive step (Article 33(3) PCT)**

3 1 D3 discloses transgenic tobacco plants overexpressing a maize GST subunit (GST-II-

**INTERNATIONAL PRELIMINARY
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International application No PCT/GB00/03573

27) Heterologous expression of the maize GST under the control of a strong constitutive promoter (GST-II-27 or CaMV 35S) confers herbicide resistance directly correlated to the level of GST expression

D4 also discloses the generation of herbicide resistant plants by transgenic expression of heterologous two-component proteins comprising GST as a first component. The teachings of D3 and D4 thus deprive the subject-matter of claims 12-25 of inventive activity

4 Industrial applicability (Article 33(4) PCT)

The subject-matter of the present set of claims appears to be industrially applicable, thus fulfilling the requirements of Article 33(4) PCT

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PATENT COOPERATION TREATY

PCT

REC'D 25 JAN 2002
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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Date of submission of the demand 08/03/2001	Date of completion of this report 22.01.2002
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Nichogiannopoulou, A Telephone No. +49 89 2399 8054



**INTERNATIONAL PRELIMINARY
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International application No. PCT/GB00/03573

I. Basis of the report

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**INTERNATIONAL PRELIMINARY
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International application No. PCT/GB00/03573

the description, pages:

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copy of the earlier application whose priority has been claimed.

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3. Additional observations, if necessary:
see separate sheet

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

restricted the claims.

paid additional fees.

paid additional fees under protest.

neither restricted nor paid additional fees.

2. This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/03573

complied with.

not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

all parts.

the parts relating to claims Nos. 1-5, 26 all completely and 14-25 all partially.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1, 2, 4, 6-27
 No: Claims 3, 5

Inventive step (IS) Yes: Claims 1, 2, 4, 6-11, 26, 27
 No: Claims 3, 5, 12-25

Industrial applicability (IA) Yes: Claims 1-27
 No: Claims

2. Citations and explanations
see separate sheet

Re Item II

Priority

1. The present application validly claims priority from 21.09.1999. Any documents cited in the International Search Report as P documents have therefore not been considered as comprised in the prior art relevant for the present application.

Re Item IV

Lack of unity of invention

1. The present application lacks unity as required by Article 3(4)(iii) PCT and Rule 13 PCT. Unity of invention exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding "special technical features", i.e. features that define a contribution which each of the inventions make over prior art. Each of the two groups of inventions listed above constitutes a separate, distinct invention for the following reason. The common concept linking these two groups is glutathione and homoglutathione metabolism. Invention I relates to herbicide detoxification by conjugation to thiol glutathione (GSH), catalysed by glutathione-S- transferase (GST). Invention II relates to the formation of homoglutathione (hGSH) catalysed by homoglutathione synthetase. Glutathione and homoglutathione as well as genes involved in their synthesis are already known from Frendo et al., 1999, Plant Journal 17: 215. Since no other "special" technical feature (Rule 13.2 PCT) could be identified to provide a linking concept between the two groups, each must be considered as a separate invention.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03573

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.1. Reference is made to the following documents:

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D2: DATABASE EMBL [Online] ACCESSION NO: AI731664, 12 June 1999 (1999-06-12) BLEWITT M.,: 'BNLGH10422 Six-day Cotton fiber Gossypium hirsutum cDNA 5' similar to (AF064201) glutathione S-transferase [Gossypium hirsutum], mRNA sequence.' XP002163494

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D4: WO 98 20144 (ZENECA Ltd) 14 May 1998 (14.05.98)

2. Novelty (Article 33(2) PCT)

The present application discloses methods for creating herbicide resistant plants using the soybean enzyme glutathione-S-transferase (GST). GST catalyses herbicide detoxification by conjugation to thiol glutathione or homoglutathione.

2.1. **D1** discloses a soybean EST that is 99.7% identical to SEQ ID No:14 of the present application over 372 nucleotides. **D1** is thus detrimental to the novelty and inventive step of claims 3 and 5.

2.2. **D2** discloses a cotton fiber EST that is 64.5% identical to SEQ ID No:14 of the present application over 580 nucleotides. **D2** is thus detrimental to the novelty and inventive step of claim 5.

3. Inventive step (Article 33(3) PCT)

3.1. **D3** discloses transgenic tobacco plants overexpressing a maize GST subunit (GST-II-

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03573

27). Heterologous expression of the maize GST under the control of a strong constitutive promoter (GST-II-27 or CaMV 35S) confers herbicide resistance directly correlated to the level of GST expression.

D4 also discloses the generation of herbicide resistant plants by transgenic expression of heterologous two-component proteins comprising GST as a first component. The teachings of D3 and D4 thus deprive the subject-matter of claims 12-25 of inventive activity.

4. Industrial applicability (Article 33(4) PCT)

The subject-matter of the present set of claims appears to be industrially applicable, thus fulfilling the requirements of Article 33(4) PCT.

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Dept. of Biological Sciences, University of Durham, South Road, Durham DH1 3LE (GB).

(21) International Application Number: PCT/GB00/03573

(74) Agents: HUSKISSON, Frank, Mackie et al.; Zeneca Agrochemicals, Intellectual Property Dept., Jealott's Hill International Research Centre, P.O. Box 3538, Bracknell RG42 6YA (GB).

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18 September 2000 (18.09.2000)

(25) Filing Language:

English

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(30) Priority Data:
9922346.3 21 September 1999 (21.09.1999) GB

(71) Applicant (for all designated States except US): SYNGENTA LIMITED [GB/GB]; Fernhurst, Haselmere, Surrey GU27 3JE (GB).

Published:

— with international search report

(72) Inventors; and

(75) Inventors/Applicants (for US only): ANDREWS, Christopher, John [GB/GB]; Jealott's Hill International Research Centre, Bracknell, Berkshire RG42 6ET (GB). JEPSON, Ian [GB/GB]; Jealott's Hill International Research Centre, Bracknell, Berkshire RG42 6ET (GB). TOWNSON, Jane, Karen [GB/GB]; Jealott's Hill International Research Centre, Bracknell, Berkshire RG42 6ET (GB). EDWARDS, Robert [GB/GB]; Dept. of Biological Sciences, University of Durham, South Road, Durham DH1 3LE (GB). CUMMINS, Ian [GB/GB]; Dept. of Biological Sciences, University of Durham, South Road, Durham DH1 3LE (GB). SKIPSEY, Mark [GB/GB];

(88) Date of publication of the international search report:
7 September 2001

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/21770 A3

(54) Title: GST SEQUENCES FROM SOYBEAN AND THEIR USE IN THE PRODUCTION OF HERBICIDE RESISTANT PLANTS

(57) Abstract: The present invention relates to *inter alia*, Glutathione-S-Transferase (GST) and homoglutathione synthetase sequences from soybean and their use in the production of plants which are resistant to herbicides which comprise fomesafen and/or acifluorfen. In a particular embodiment the invention provides a GST depicted as SEQ ID No. 10 and a homoglutathione synthetase depicted as SEQ ID No. 1.

INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/GB 00/03573

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 C12N15/54 C12N15/52 C12N15/82 C12N9/10 C12N9/00
 A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EMBL, BIOSIS, EPO-Internal, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE EMBL 'Online! ACCESSION NO: AI440996, 16 March 1999 (1999-03-16) SHOEMAKER R.,, ET AL.: "sa63f01.y1 Gm-c1004 Glycine max cDNA clone GENOME SYSTEMS CLONE ID: Gm-c1004-3986 5' similar to TR:004562 004562 T7N9.15. ;, mRNA sequence." XP002163493 the whole document --- -/-</p>	3,5

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

21 March 2001

Date of mailing of the international search report

02/04/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
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Maddox, A

INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/GB 00/03573

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE EMBL 'Online! ACCESSION NO: AI731664, 12 June 1999 (1999-06-12) BLEWITT M.,: "BNLGH10422 Six-day Cotton fiber <i>Gossypium hirsutum</i> cDNA 5' similar to (AF064201) glutathione S-transferase ' <i>Gossypium hirsutum</i> !, mRNA sequence." XP002163494 the whole document ---	5
X	DATABASE EMBL 'Online! ACCESSION NO: Y10984, 2 July 1997 (1997-07-02) SCHAEFER H.J., ET AL.: "B. <i>junccea</i> mRNA for glutathione synthetase" XP002163495 the whole document ---	6, 9, 10, 27
X	FRENDO PIERRE ET AL: "Localisation of glutathione and homoglutathione in <i>Medicago truncatula</i> is correlated to a differential expression of genes involved in their synthesis." PLANT JOURNAL, vol. 17, no. 2, January 1999 (1999-01), pages 215-219, XP002163491 ISSN: 0960-7412 the whole document -& DATABASE EMBL 'Online! ACCESSION NO: AF075699, 13 May 1999 (1999-05-13) FRENDO P., ET AL.: "Medicago truncatula putative glutathione synthetase (GSHS1) mRNA, partial cds." XP002163509 the whole document -& DATABASE EMBL 'Online! ACCESSION NO: AF075700, 13 May 1999 (1999-05-13) FRENDO P., ET AL.: "Medicago truncatula putative glutathione synthetase (GSHS2) mRNA, partial cds." XP002163510 abstract ---	6, 9, 10
X	DATABASE EMBL 'Online! ACCESSION NO: AF017984, 23 September 1997 (1997-09-23) KOVARI I.A.,: "Lycopersicon esculentum glutathione synthetase (GSH2) mRNA, complete cds." XP002163496 the whole document ---	6, 9, 10, 27
		-/-

INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/GB 00/03573

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	<p>DATABASE EMBL 'Online! ACCESSION NO: AW471665, 2 March 2000 (2000-03-02) SHOEMAKER R., ET AL.: "s114c11.y1 Gm-c1029 Glycine max cDNA clone GENOME SYSTEMS CLONE ID:Gm-c1029-1197 5' similar to TR:004941 004941 GLUTATHIONE S-TRANSFERASE TSI-1 ;, mRNA sequence." XP002163497 the whole document</p> <p>---</p>	1-3, 5, 26
P, X	<p>DATABASE EMBL 'Online! ACCESSION NO: AJ272035, 11 May 2000 (2000-05-11) SKIPSEY M.: "Glycine max mRNA for homoglutathione synthetase (hGS gene)" XP002163498 the whole document</p> <p>---</p>	6-11, 27
P, X	<p>WO 00 47728 A (DU PONT) 17 August 2000 (2000-08-17) see SEQ ID NOS:7 and 8</p> <p>---</p>	26
P, X	<p>WO 00 18936 A (DU PONT) 6 April 2000 (2000-04-06) see SEQ ID NOS:7 and 8</p> <p>---</p>	26
P, X	<p>US 6 063 570 A (MCGONIGLE BRIAN ET AL) 16 May 2000 (2000-05-16) see SEQ ID NOS:7 and 8</p> <p>---</p>	26
A	<p>DATABASE EMBL 'Online! ACCESSION NO: AF004358, 19 June 1997 (1997-06-19) RIECHERS D.E., ET AL.: "Aegilops tauschii glutathione S-transferase TSI-1 mRNA, complete cds." XP002163499 the whole document</p> <p>---</p>	1-5
A	<p>DATABASE EMBL 'Online! ACCESSION NO: AC007258, 12 April 1999 (1999-04-12) FEDERSPIEL N.A.,: "Arabidopsis thaliana chromosome I BAC F23H11 genomic sequence, complete sequence." XP002163500 see /db_xref="SPTREMBL:Q9XIF8"</p> <p>---</p>	1-5
		-/-

INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/GB 00/03573

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	SKIPSEY ET AL: "substrate and thiol specificity of a stress-inducible glutathione transferase from soybean" FEBS LETTERS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 409, 1997, pages 370-374, XP002103751 ISSN: 0014-5793 the whole document ---	1-5, 17-26
A	MCGONIGLE B ET AL: "HOMOGLUTATHIONE SELECTIVITY BY SOYBEAN GLUTATHIONE S-TRANSFERASES" PESTICIDE BIOCHEMISTRY AND PHYSIOLOGY, ACADEMIC PRESS, US, vol. 62, no. 1, October 1998 (1998-10), pages 15-25, XP000925695 ISSN: 0048-3575 the whole document ---	1-5, 17-26
A	ANDREWS C J ET AL: "Glutathione transferases in soybean." JOURNAL OF EXPERIMENTAL BOTANY, vol. 49, no. SUPPL., May 1998 (1998-05), pages 22-23, XP000990440 The Society for Experimental Biology Annual Meeting; London, England, UK; March 22-27, 1998 ISSN: 0022-0957 the whole document ---	1-5, 17-26
A	ANDREWS CHRISTOPHER J ET AL: "Glutathione transferase activities toward herbicides used selectively in soybean." PESTICIDE SCIENCE, vol. 51, no. 2, 1997, pages 213-222, XP002163492 ISSN: 0031-613X the whole document ---	1-5, 17-26
A	DATABASE CHEMABS 'Online!' CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; AN - 128:164220 , SKIPSEY, M., ET AL.: "Purification and characterization of glutathione transferase enzymes from soybean seedlings" XP002163501 abstract & BRIGHTON CROP PROT. CONF.--WEEDS (1997), (VOL. 2), 789-794 ISSN: 0955-1514, --- -/-	1-5, 17-26

INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/GB 00/03573

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 99 14337 A (RHONE POULENC AGRICULTURE ;CUMMINS IAN (GB); COLE DAVID J (GB); ED) 25 March 1999 (1999-03-25) see SEQ ID NO:16 ---	1-5, 17-26
A	DATABASE BIOSIS 'Online! BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; 1988 KLAPHECK S ET AL: "PROPERTIES AND LOCALIZATION OF THE HOMOGLUTATHIONE SYNTHETASE FROM PHASEOLUS-COCCINEUS LEAVES" Database accession no. PREV198987097317 XP002163529 abstract & PHYSIOLOGIA PLANTARUM, vol. 74, no. 4, 1988, pages 733-739, ISSN: 0031-9317 ---	6-11
A	MCKERSIE B D ET AL: "Superoxide dismutase enhances tolerance of freezing stress in transgenic alfalfa (<i>Medicago sativa L.</i>)" PLANT PHYSIOLOGY, US, AMERICAN SOCIETY OF PLANT PHYSIOLOGISTS, ROCKVILLE, MD, vol. 103, no. 4, December 1993 (1993-12), pages 1155-1163, XP002118434 ISSN: 0032-0889 page 1159, right-hand column; figure 3 page 1162, left-hand column, paragraph 2 -----	15-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int'l Application No

PCT/GB 00/03573

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO 0047728	A 17-08-2000	NONE		
WO 0018936	A 06-04-2000	AU 1185499	A	17-04-2000
US 6063570	A 16-05-2000	NONE		
WO 9914337	A 25-03-1999	AU 9089398	A	05-04-1999
		EP 1015603	A	05-07-2000
		ZA 9808434	A	16-03-1999

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PPD50449/WO	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 03573	International filing date (day/month/year) 18/09/2000	(Earliest) Priority Date (day/month/year) 21/09/1999
Applicant ZENECA LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 6 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. **Certain claims were found unsearchable** (See Box I).

3. **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

ST/GB 00/03573

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N15/54 C12N15/52 C12N15/82 C12N9/10 C12N9/00
A01H5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C12N A01H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EMBL, BIOSIS, EPO-Internal, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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"O" document referring to an oral disclosure, use, exhibition or other means

•P• document published prior to the inter-
 later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 March 2001	02/04/2001
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Maddox, A

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 00/03573

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

International Application No

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P, X	WO 00 47728 A (DU PONT) 17 August 2000 (2000-08-17) see SEQ ID NOS:7 and 8 ---	26
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A	DATABASE EMBL 'Online! ACCESSION NO: AC007258, 12 April 1999 (1999-04-12) FEDERSPIEL N.A.,: "Arabidopsis thaliana chromosome I BAC F23H11 genomic sequence, complete sequence." XP002163500 see /db_xref="SPTREMBL:Q9XIF8" ---	1-5
		-/-

INTERNATIONAL SEARCH REPORT

International Application No

T/GB 00/03573

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